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ABSTRACT

This publication is the final report on a seminar which addressed the role of the new information technologies in the development of education in Africa. Participants included delegates from 37 African member states, two inter-governmental organizations, two non-governmental organizations, four educational institutions, two private institutions, and a multilateral financing agency. Experts invited by the United Nations Educational, Scientific, and Cultural Organization (UNESCO) and the Agency for Cultural and Technical Cooperation (ACCT) were also present. The first of four chapters in the report describes the plenary sessions, including the inaugural session, constitution of the bureau, introductory addresses, and the sequence of the proceedings. The proceedings of the plenary session are summarized in the second chapter, and the third discusses elements of a program of action proposed by the working groups. These include the policy and strategy for the incorporation of information technologies in education; research and development--the production of instructional computer software, maintenance, and the problem of national languages; and inter-African and international cooperation. Additional proposals concerned with teacher education and policy formation are presented in the fourth chapter. The first seven appendices contain addresses made at the opening session or the closing session by the Rector of the University of Benin (Togo), the Secretary-General of ACCT, the Director-General of UNESCO, and the Togolese Minister of Technical Education and Vocational Training. The two final appendices contain a list of participants and a list of related working documents. (DB)

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UNESCO

Priority: Africa

Programme of Action proposed by the Director-General
(1990-1995)

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Seminar on informatics in the service of the development of education in Africa

Lomé, Togo
3-7 December 1990

Final Report

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PRIORITY: AFRICA

PROGRAMME OF ACTION PROPOSED BY THE DIRECTOR-GENERAL

(1990-1995)

INFORMAFRICA SEMINAR

INFORMATICS IN THE SERVICE OF THE DEVELOPMENT OF EDUCATION IN AFRICA

LOME (Togo)
3-7 December 1990

FINAL REPORT

In co-operation with
the Cultural and Technical Co-operation Agency (ACCT)
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January 1991

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FOREWORD

The Priority: Africa programme, the subject of Resolution 27 adopted by the UNESCO General Conference at its 25th Session in November 1989, comprises a series of innovative activities designed to develop the national capacities of African Member States. To this end, its goal is to give effect to the major lines of action of the United Nations Programme of Action for African Economic Recovery and Development, 1986-1990, adopted in June 1986. The Priority: Africa programme seeks essentially to help African countries to overcome difficulties of an economic, social and cultural nature through the promotion of international, regional and sub-regional co-operation. Informatics and the technologies associated with it are among the fields covered by such co-operation.

It was for this reason that the 2nd Summit Meeting of Heads of Francophone States, held in Quebec in 1987, incorporated an Education and Informatics project in its Education and Training programme, for whose implementation the Cultural and Technical Co-operation Agency (ACCT) is responsible.

In their Final Declaration, the participants at the International Congress on Education and Informatics, organized by UNESCO in April 1989, proposed to: "contribute to correcting the existing inequalities in new information technologies development in education between countries by increasing international co-operation, while: ...helping the less-privileged and developing countries to develop their expertise in the procurement, deployment and possible production of hardware and by facilitating availability of educational software through appropriate licensing arrangements, co-operative projects and development of national capabilities of designing educational software relevant to the local needs and culture".

This Declaration consequently made an appeal "to the Director General of UNESCO, as well as to executive heads of agencies of the United Nations, in particular the International Labour Organization, the United Nations Industrial Development Organization, the United Nations Development Programme, the World Bank, the regional development banks, and other inter-governmental and non-governmental organizations, to extend strong support to the judicious application of new information technologies in education so as to help bridge the gap in this domain between developing and industrialized nations".

And this inequality applies particularly to Africa, whose share in the world's total expenditure on informatics is around 0.3 %. This figure alone is enough to justify making a considerable effort in this region to introduce informatics in general, and to introduce it first and foremost in education and training systems, which are instruments for the development of human resources. This use of informatics in education is nowadays seen as an ineluctable phenomenon.

Such are the reasons which led UNESCO, in co-operation with the Cultural and Technical Co-operation Agency (ACCT) and with the collaboration of the University of Benin, to organize this Seminar on Informatics in the Service of the Development of Education in Africa, the Final Report of which is presented in the pages that follow.

The Lomé Seminar was attended by delegates from 37 African Member States, two inter-governmental organizations, two non-governmental organizations, four educational institutions, two private institutions, and a multilateral financing agency. Nineteen experts invited by UNESCO and ACCT were also present. As the participants see it, the Final Report should form the basis of a regional programme of action ensuring a coherent effort of co-operation among African Memeber States and between them and the international community.

I. - PLENARY SESSIONS

A. INAUGURAL SESSION

The Informafrica Seminar was opened by Mr Koffi O. Edoh, Togolese Minister of Technical Education and Vocational Training, who welcomed the participants. He emphasized the timeliness, importance and difficulties of putting informatics into the service of the development of education in Africa, and maintained in particular that informatics, properly adapted to the economic and socio-cultural environment of Africa, could be a valuable aid to teaching and learning. Paying tribute to the unremitting efforts of UNESCO and ACCT to modernize school curricula, and to these organizations' initiative in organizing the Informafrica Seminar in Lomé, the Minister stated that the question of informatics in education had advanced beyond the "why?" stage and was now posed in terms of "how?".

After briefly describing the stage informatics had reached in the education system of Togo, the Minister made special reference to international exchanges in this field and to the policy of training instructors. He suggested that thought be given to the question of producing, at low cost, software matched to the educational needs of Africa.

Lastly, he expressed the hope that the discussions of the Seminar would lead to the formulation of an overall policy for the use of informatics in education in Africa.

The opening address was preceded by the communication of messages from the Director-General of UNESCO and the Secretary-General of ACCT, read respectively by Mr John B. Kaboré, Director of Co-operation with African Member States in UNESCO, and Mr Paul Lessard, head of the

Informatics and Telecommunications programme of the "Ecole Internationale de Bordeaux".

In his message Mr Jean Louis Roy, Secretary-General of ACCT, welcomed the participants and briefly explained what ACCT and the "Ecole Internationale de Bordeaux" are and what they do. He stated that in the light of the results of the work of the Informatics and Education Committee the time had come to make a qualitative step forward by stepping up the mobilization of African countries for the introduction of informatics in education. He made reference to the training of instructors involved in the suitably adapted introduction and development of informatics in African education systems. In conclusion, he expressed the hope that the Seminar would make it possible to identify opportunities for the implementation of projects to make optimum use of information technologies in Africa.

Mr Federico Mayor, Director-General of UNESCO, thanked in his message the Togolese authorities and the University of Benin, and welcomed the participants. Recalling the general objectives of the Priority: Africa programme, which formed the context of the Informafrica Symposium and its subsequent follow-up, he pointed out the need to pay special attention to the Africa Region, and in particular to promote the launching of a coherent informatics development programme.

Mr Mayor stated that at the present time, when know-how and innovation are determining factors in economic competitiveness, it is more than ever important to promote education and training in this programme so as to face up to the challenge of development through the informatics revolution. Lastly, the Director-General emphasized that UNESCO was naturally prepared to favour this process by promoting international, regional and sub-regional co-operation.

B. CONSTITUTION OF THE BUREAU

Following these addresses and messages, and after a break in the Session, the following participants, proposed by the organizers, were elected by a unanimous show of hands:

Mr	Massan Gninininvi	(Togo)	: Chairman
Mr	J.M. Masunga	(Kenya)	: Vice-Chairman
Mr	Mahmoud Masmoudi	(Tunisia)	: Vice-Chairman
Mr	Abdoulaye Diakite	(Guinea)	: Rapporteur

C. INTRODUCTORY ADDRESSES

The Bureau having been constituted, the participants took cognizance of information relating to the three main aspects of the subject identified in the Agenda and the Discussion Guide:

- Informatics as a subject to be taught;
- Informatics as a teaching aid;
- Informatics as an instrument of management.

First, Mr E.A. Owolabi, of the UNESCO Inter-governmental Informatics Programme (IIP), presented the working documents prepared by the Organization, after which Mr Jean Grégoire, of the Department of Evaluation and Co-operation Strategies of the Ministry of Higher Education and Science, Quebec, introduced the working documents prepared by ACCT.

Several introductory addresses were then delivered. Mr Peter Bollerslev, Vice-Chairman of the Technical Committee of the International Federation for Information Processing (IFIP), presented a standard primer of instruction in information technology for the use of teachers. He considered that certain fundamental principles embodied in this model were transposable independently of the Northern European socio-

economic and cultural context in which the primer had been developed.

Mr Daniel Walker, Assistant Director of the Scottish Council for Educational Technology, dealt with informatics as a teaching aid and made a number of critical comments concerning the technology of the design of educational software. In his view, the major challenge in the future lay not in software, nor in informatics itself, but in the adaptation of education to new technologies.

Mr Jean Vergnes, Director of the International Informatics Centre of the University of Aix-Marseille, raised the problems of the introduction of informatics in education in terms of the systems approach, which necessarily leads to the formulation of a national policy and an associated strategy. The speaker placed particular emphasis on a new type of training for instructors incorporating, in addition to training in the uses of informatics in education, a mission of pedagogic research and advice for decision-makers.

Mr Marius Francesco, the Benin Director of Informatics, examined the problem from the angle of a fundamental question, namely how to face up to the challenge of African development through the training of human resources. He enumerated the cultural, situational and human obstacles, and maintained that the introduction of informatics in education involved a reform of curricula.

Mr Pierre Bordeleau, Chairman of APO-QUEBEC, took as his subject "The incorporation of new information technologies (NTI) in education: policies and strategies". After defining technology and pedagogy, he explained that this incorporation was not so much a question of technology as of pedagogy, and he placed importance on an appropriate techno-pedagogic environment to facilitate the creation of educational software, which need not be costly. Africa should make a qualitative step forward by taking the fullest advantage of the opportunities offered by new information technologies to reform and re-think

its education systems and to orient training towards the future, avoiding a repetition of the mistakes made in developed countries. The speaker described the methodology of incorporating new information technologies in education, and presented the accompanying documentation.

D. SEQUENCE OF PROCEEDINGS

Following these introductory addresses, the Seminar took cognizance of case studies prepared by UNESCO and monographs compiled by ACCT (INFODUC survey). These documents related mainly to experiences of the application of informatics to education.

A brief account was given of the general situation and/or the limited experience of each of the 37 countries represented concerning the use of informatics in education.

This information was complemented by communications by representatives of African institutions such as the African Informatics Institute (IAI) in Libreville, the Ecole Nationale Supérieure de Technologie (ENSUT) in Dakar, and the Informatics Institute of the University of Nairobi.

UNESCO's Intergovernmental Informatics Programme (IIP) was also presented to the participants, together with the activities of ACCT in the field of the application of informatics to education, and the activities of international institutes and organizations such as the International Association of Universities (IAU), the International Federation for Information Processing (IFIP), the Galileo Centre in Brussels, and the Centre National de Documentation Pédagogique (CNDP) in Paris.

These exchanges of information in Plenary Session made it possible to tackle various problems connected with the introduction of informatics in education, relating in

particular to "policies and strategies to be adopted" and "socio-economic, cultural and pedagogic constraints".

Following this general discussion, three working groups were constituted to examine the following important areas:

- Policies and strategies for the incorporation of informatics in education (Group I);

- Research and development, software production, maintenance, and the problem of national languages (Group II);

- International and regional co-operation (Group III).

The work of these groups resulted in suggestions and proposals in the form of elements of a programme of action. They were discussed and adopted in Plenary Session (Chapter IV) in addition to others put forward in Plenary Session (Chapter V).

At the closing Plenary Session, after discussion and adoption of the Final Report the participants moved votes of thanks to the Togolese authorities, UNESCO, and ACCT. The organizers then assured the participants of their institutional support in the implementing of the recommendations of the Informafrica Seminar. After the closing addresses by the Representatives of the Director-General of UNESCO and the Secretary-General of ACCT, the Representative of the Togolese Minister of Education and Scientific Research delivered the final closing address.

II. - SUMMARY OF PROCEEDINGS IN PLENARY SESSION

1. During the discussions, the participants gave prominence to the situation in their respective countries regarding the use of informatics for the management of the education system and/or as a teaching aid. Though experiments have been made or are in progress in some African countries, many others are still at the preliminary stage of policy formulation.

2. However, most countries have had some experience, with varying degree of success, of the use of informatics as a tool of educational management. In particular, informatics is used to an increasing extent for planning and statistical work and for administrative work connected with grants and examinations.

3. Prominent among the points raised was the need for a firm political determination, essential for embarking upon a process of educational innovation. This political determination must be the consequence of an awareness of the decision-making authorities at different levels, brought about by a sound and convincing line of argument together with an evaluation of needs, foreseeable results, and appropriate strategy. Furthermore, in this particular field decision-makers have difficulty in discerning what measures are urgent and in defining priorities and formulating corresponding decisions, all in a context of limited national resources - human material and informational.

4. This problem stems essentially from the lack of national experts able to master at one and the same time the problems of education and informatics in general, the educational sciences, and educational planning.

5. In addition, the democratization of education calls for the formulation of a policy and the implementation of a stategy for the introduction of informatics in education for all. This is the key condition for the success of any educational innovation.

6. The participants in the Seminar also placed importance on the need for each country to have a national plan of informatics development for all sectors of activity, and for education in particular. Such a plan should not be confined to immediate economic needs; and it should cover both formal and non-formal education at all levels.

7. In this context, national priorities must be defined, along with a general strategy, a policy where hardware and software are concerned, and a training programme for specialists and instructors.

8. A plan for introduction informatics in education must therefore be prepared, and it must be co-ordinated with a national informatics plan and the national economic and cultural development plan (if there is one).

9. An informatics plan must comprise two crucial stages: the experimental stage and the evaluation stage. At each stage, human, material and financial resources must be mobilized; and this supposes a financial and budgetary policy. The mobilization of internal resources must be combined with that of external sources in the framework of regional and international co-operation.

10. Where such co-operation is concerned, the seminar advocated the creation or strengthening of regional or sub-regional centres of informatics resources for education, whose tasks would be to promote and disseminate the educational applications of informatics.

Their mission would include, in particular:

- the training and further training of African specialists through courses, seminars and workshops;

- assistance in researching, designing, testing and using educational software;

- the provision of information and expertise for all users and education authorities.

11. The participants proposed the strengthening of existing regional co-operation structures such as the African Institute of Informatics and various other training and co-operation organizations concerned with education and informatics. This would make it possible to consolidate what had already been achieved and to make better use of regional resources, especially human resources.

12. The development of African skills in the use of new information and communication technologies for the development of education is a requirement that involves not only governmental structures but also associations of informatics specialists, teachers, other partners in education, and non-governmental organizations.

13. Consequently the setting up of a network of African specialists in informatics applied to education is seen as essential in the context of exchanges of information and experience. In this respect, technical co-operation between developing countries can make a valuable contribution.

14. The regular publication of a liaison bulletin would be an effective vector of communication between African countries and between them and their international partners. This bulletin would also help to learn lessons from international experience and to grasp opportunities of educational innovations throughout the world.

15. The backing of UNESCO (notably through its Regional Offices), ACCT, international non-governmental organizations like IFIP, and existing international networks is needed to help to set up networks of specialists and associations at the continental level.

16. These new structures should play an increasingly important role, particularly in the context of the considerable economic and financial difficulties with which African countries have been faced for several years past.

III. - ELEMENTS OF A PROGRAMME OF ACTION PROPOSED BY THE WORKING GROUPS

A. POLICY AND STRATEGY OF INCORPORATION OF INFORMATICS IN EDUCATION

Group I highlighted a number of essential points to be considered before giving thought to policies for the introduction of informatics in education and to corresponding strategies. These points fall under two main headings:

- The awareness of all the protagonists involved in the process of introducing informatics in education, at all levels.

- The political resolve without which there can be no change in the cultural and educational environment.

Where awareness is concerned, it applies to all decision-makers and teachers, and to the general public, having regard to the fact that everyone does not consider the introduction of informatics in education to be a foregone conclusion; far from

it. A methodological study of the cultural and educational environment was proposed, comprising:

- The analysis of needs;
- The definition of objectives;
- Policies and plans of action;
- Structures;
- Monitoring and evaluation.

The following proposals were adopted:

1. The preparation of an instrument for heightening the awareness of political and administrative decision-makers so that they may be informed of the results of research and practical achievements in this field, and of examples of the successful application of informatics to education, whether as a subject taught, an aid to teaching and learning, or a tool of management. This effort could be backed up by the organization of national and regional symposia.

2. The creation of a working group to prepare or develop an instrument for helping to incorporate informatics in education, using a method involving standard questions relating to the three main aspects of such incorporation.

3. A detailed analysis, by this same group, of African countries' responses, up to the present, to various surveys (conducted by UNESCO, IIP, ACCT, etc.) so as to identify common trends. This will make it possible to prepare a unique directory which can also serve as a guide to the introduction of informatics in education.

4. Special attention to African countries which lag behind others in the introduction of informatics in education, by allowing them a greater participation in in sub-regional, regional and international activities in the fields concerned and helping them to take specific steps to catch up.

B. RESEARCH AND DEVELOPMENT

Group II concerned itself mainly with problems relating to software.

1. Software

Four initial observations were made:

- The introduction of informatics in education supposes the existence of a software policy (acquisition, adaptation, research, development, creation, circulation, financing, and integration in curricula);

- In many countries there is a considerable amount of software that has been tested, evaluated and approved by the institutions responsible;

- The creation of software may necessitate the setting up of regional resource and production centres;

- The costs incurred by any given policy may be high, and must be estimated and compared.

Consequently, the Group advocated:

- An evaluation of the software adopted by the education systems of many countries (whether purchased on the market, acquired in the context of co-operation, etc.); this evaluation should take account of the national policy, the cultural acceptabiliy of the software, and its adaptability to the content of education and training.

- The creation of educational software which does not exist in the above context.

2. Software creation centres

Considering the magnitude of the efforts and resources ncessary for the production of software, it was proposed to encourage:

- The setting up of national, or even regional, centres of software resources and evaluation and of educational software creation. These centres must be interconnected so as to facilitate exchanges of information, documentation, software, and the results of research.

- The creation of software banks containing software that may be legally circulated; these banks could possibly be sponsored by UNESCO, and would be responsible for supplying software and facilitating its consultation.

3. Research and development

Research and development in the field of educational software being a matter of concern to African countries, it was recommended that special funds be made available for the training of experts to help teams responsible for educational software design (including the adaptation of foreign software), evaluation and maintenance, and for the associated educational strategies. These funds from various sources (business, industry, international institutions, etc.) could be constituted, managed and controlled, in ways yet to be defined, with the help of UNESCO.

As in the past, the use of national languages in educational software should be encouraged. But it was pointed out that the question arises differently in countries which have a single national language and in other countries.

4. Training

In view of the rapid advance of information technology and the knowledge required to create educational software, it was considered desirable that:

- Training centres for specialists in software design and the formulation of associated teaching and learning strategies be established and subsidized.

- These centres should help to disseminate information concerning the progress of, and future trends in, the applications of informatics in education.

- Some of the specialists trained in these centres be assigned the task of organizing seminars and other training activities relating to the methodology and the application of informatics in education.

5. The use of commercial software

In view of present trends in the use of generic software packages (word processing, spreadsheets, data-base management, etc.) currently available on the international market, it was proposed to make use of them systematically (teaching and learning involving word processing, preparation of written material, marking of pupils' work, etc.).

6. Choice and maintenance of hardware

Having regard to the problems arising in an educational environment in which different types of computer are used, it was advocated that:

- Hardware be matched (especially with regard to standards and configurations) to the limitations imposed by the educational software employed.

- Regional maintenance centres (if need be with the backing of UNESCO) be set up, comparable to CAFMICRO in Lomé.

C. INTER-AFRICAN AND INTERNATIONAL CO-OPERATION

Group III examined the priorities and forms of regional and international co-operation in the field of the applications of informatics to the development of education in Africa. Co-operation in this field is necessary for two fundamental reasons:

- To build up the critical masses essential to facing up to the challenge of informatics, common to all African countries, which are generally too small to achieve anything significant in isolation;

- The essentially international nature of information technology.

The following proposals were adopted:

1. **Three principal areas for co-operation may be distinguished:**

   - Human Resources: this is the top priority of all. Regional co-operation should promote the training of instructors (for teaching and for educational management) and the development of expertise where policies, plans and strategies are concerned;

   - Hardware: regional and international co-operation should aim at ensuring, for African countries, the "operational security" (dependability, durability, maintenance, etc.) of hardware through the development of national and regional capacities of adaptation and adequation of hardware to the African environment.

   - Software: co-operation should be aimed at developing national and regional capacities for the

acquisition, adaptation, production, circulation, researching and development of educational software in function of requirements and of the cultural environment. A policy of "combined licenses" (joint funding by the State and by the final user) and of bulk purchasing should be encouraged. Software banks could be gradually built up and made available.

2. Priority measures and forms of co-operation

Identification of what already exists. This is the fundamental preliminary to all future measures where co-operation is concerned. The Group recommended the compilation and publication of three directories: African institutions specializing in informatics in education, African experts (including those working in the field) in informatics in education, and priority subjects of research in the applications of informatics in education in Africa.

The promotion of regional and sub-regional centres of research and development and training, notably for the maintenance of hardware and for research and development where software is concerned, taking account of the geopolitical and linguistic facilities of existing centres (e.g. the Lomé centre for the maintenance of micro-computer hardware).

The promotion of regional and sub-regional networks of institutions and experts, making use of all conventional media of communication, including telematics whenever possible. The promotion of feasibility studies of sub-regional telematic networks in the framework of a major Pan-African telematic network currently under study.

Information, documentation and communication. The Group recommended the launching of a bilingual newsletter dealing with regional exchanges, and a feasibility study

of an international periodical on this subject. It also recommended the promotion of sub-regional documentation centres and their interconnection.

The promotion of a North-South partnership embracing both the public and private sectors in the field of information technology and favouring the North-South association and twinning of institutions so as to encourage South-South co-operation.

The development of a greater concertation and co-operation among international organizations in their cultural activities in Africa. To this end, the Group recommended the systematic publication of projects in progress which have the backing of international or bilateral institutions, specifying the objectives and activities of such projects, the African partners involved, and their funding. The Group also recommended the production of a directory of international sources of financing of projects relating to the application of informatics to education.

Professional associations. The Group strongly recommended the creation or strengthening of specifically African professional associations (such as, for example, the Association Africaine des Spécialistes de l'Informatique) at the national, sub-regional and regional levels. These associations should enjoy the backing and the active co-operation of governments and of international organizations.

With regard to international professional organizations (such as IFIP) the Group considered it highly desirable that they extend their activities in Africa, that African sections of these associations be promoted, and that facilities be provided for the participation of African nationals in their activities outside Africa.

IV. ADDITIONAL PROPOSALS

The participants identified a number of priority centres of interest:

- The formulation on a national level of a policy and of a corresponding strategy;
- The heightening of awareness;
- Information and its communication;
- Research and development;
- The training of instructors;
- Maintenance;
- Partnership.

Some of these points were the subject of detailed proposals in the reports of the three Working Groups (cf. Chapters II and III above); in what follows mention is made only of those which were less developed within the Groups, were examined in Plenary Session, and form part of the elements of a regional programme of action.

1. To promote feasibility studies of sub-regional telematic networks leading to the gradual establishment of an African telematic network, in the framework of the UNESCO AFSTINET project (African Scientific and Technical Information Network), which is a central component of the UNESCO programme of the Management of Science and Technology in Africa.

2. To back up awareness-heightening activities undertaken by Member States where the introduction of informatics in education is concerned.

3. To promote centres of applied research in the area of new information technology in the education sector. These regional or sub-regional centres can play a leading role in the exchange of information, documentation, software, the results of research, and so on. They should be based on existing operational structures.

4. To prepare and set up programmes for the training of instructors and specialists in the application of informatics to education and in the planning of informatics training.

5. To give strong encouragement to the evaluation of what has already been done and to the the adaptation of certain teaching and learning applications of informatics.

6. To strengthen support of African co-operation structures where training in maintenance is concerned.

7. To favour the setting up of national centres of informatics facilities in close collaboration with certain specialized structures such as electrical engineering departments or any other structures that can contribute to the maintenance and evaluation of hardware.

8. To request UNESCO and ACCT, the originators of the Seminar, to step up the capacity of their Regional Offices for the implementing of the present recommendations. To seek also the help of other United Nations Agencies and of funding agencies at various levels to back up the action of UNESCO and ACCT in the field in question.

ANNEX I

ADDRESS BY THE RECTOR OF THE UNIVERSITY OF BENIN (TOGO) AT THE OPENING SESSION

Member of the Political Bureau,

Minister of Technical Education and Vocational Training,

Your Excellencies, Ambassadors and Representatives of the Diplomatic Corps,

Representative of the Director-General of UNESCO,

Representative of the Cultural and Technical Co-operation Agency,

Deans of Faculties, Directors of Schools and Institutes,

Ladies and Gentlemen.

UNESCO and the Cultural and Technical Co-operation Agency (ACCT) have chosen our country and University for the organisation of their Seminar on Informatics in the Service of the Development of Education in Africa. We are pleased and proud in more than one respect.

First of all, because as far as the Togolese Government and our Party, the RPT, are concerned, anything concerning education and training should be given top priority. The sharing of ideas and experience on which you will embark today is in line with this policy.

Secondly, because the theme of your seminar, the relevance of which is obvious, concerns all the partners involved in education and training. The question is whether, in an Africa

where illiteracy is dangerously widespread and our intermediate and secondary schools function under difficult conditions, it is timely to begin or to develop the introduction of informatics in education.

What is at issue is not the importance of the informatics. This tool is already being used in all human activities: scientific, administrative, commercial, medical and even artistic. Do not all these fields stem from the mainstream of education and training?

Repetetive operations and tedious calculations are no longer a burden for the engineer, the researcher or the teacher. They can devote more time to creativity and innovation.

The computer is present everywhere: in the physical sciences, in the design of civil engineering structures, in administration and management, in the automation of production in factories, and in telecommunications.

In hospitals it helps in management and in the monitoring of patients' records, and in the processing of certain complex analyses.

Finally, in education and training, the computer has been found to be a remarkable tool for awakening the intelligence of the child.

All these advantages should not cause us to lose sight of the most serious handicap to its introduction into education in Africa. This is the cost, which although it has fallen on the international market, still remains too high for the low budgets of schools in Africa. But can the cost of the operation justify the fact that the majority of countries in our continent continue to do without this tool, without which the gap separating us from the developed countries will continue to widen?

Your presence today in Lomé is in itself a response to this question.

UNESCO, which as we know works in close conjugation with developing countries, has responded by initiating its Informatics programme and Priority: Africa programme. Informatics and the new technologies associated therewith can be the levers of a qualitative and quantitative transformation which will provide Africa with the human resources able to guarantee a sustainable development with due regard for its cultures and traditions.

This is not the ACCT's first experience of co-operation with the University of Benin. We have just referred to its Seminar on Data-base Management organised jointly with the University of Benin.

I know that many technical problems remain to be solved. However, we pin our hopes on meetings such as the one we are opening today, and on the quality of the attendance at such meetings.

I wish to take this opportunity of commending the members of CINERA, who are conducting an experiment with the University of Benin, the fruits of which are already visible in our countries.

I wish you a pleasant and fruitful week's stay in Lomé.

Thank you all for accepting our invitation and participating in this opening ceremony.
I hope that your seminar will be a complete success.

K.F. Seddoh,
Rector of the University of Benin

ANNEX II

MESSAGE FROM THE SECRETARY-GENERAL OF ACCT,
READ BY MR PAUL LESSARD AT THE OPENING SESSION

Minister,

Your Excellencies,

Ladies and Gentlemen.

It is a privilege and a pleasure to welcome you to this Seminar on Information Technology in Education on behalf of the Secretary-General of the Cultural and Technical Co-operation Agency (ACCT). It is gratifying to note that so many high-level personalities have consented to attend this seminar to share their experiences and research on the subject of the introduction of information technology in education and to seek lines of approach to practical, useful and visible measures to achieve closer North-South and South-South collaboration and co-operation.

First I shall briefly explain what the Cultural and Technical Co-operation Agency is and does. It was created in Niamey in 1970 at the behest of some twenty French-speaking States who wished to join forces. The principal mission of this international organization is to implement multilateral co-operation in the fields pertaining to education, culture, science and technology with the object of furthering the development of French-speaking peoples.

Today, the ACCT has 41 Member States. As its Charter states it is the expression of a new solidarity and a further factor of rapprochement among peoples through international dialogue.

The ACCT has two units outside its headquarters: a Regional Office here in Lomé, whose Director is Mr Thomas Yablaith Manou, and the Ecole Internationale de Bordeaux in France, headed by Mr Youssouf Diawara, whose task is the further training of middle-grade and senior personnel from ACCT Member States.

This further training is organized around six programmes:

- communication;
- business;
- the environment, rural and urban development;
- the cultural industries, education;
- scientific information and documentation;
- information technology and telecommunications.

In 1988 the school was assigned the management of the "Informatics and Education" project, which was part of the "Espace Informatique Francophone" major programme ratified by Heads of State and Heads of Government at the Quebec Summit in September 1987.

This project, which is now incorporated in the field of strategic measures decided upon at the Dakar "Education and Training" Summit, is part and parcel of the work of the Paris Summit. Two symposia were organized, bringing together the top-level authorities of French-speaking countries concerned with French-language software and informatics, to propose lines of action. The Informatics and Education Committee formulated the desiderata expressed in project terms, and adopted five priority lines of action:

1. the establishment of the bases of a network of information and collaboration on matters relating to informatics and education in French-speaking areas, through the publication of a liaison bulletin;

2. the transfer of expertise and technology through the programming of international seminars for the training of instructors;

3. analysis of methods of introducing information technology and promotion of the most relevant of such methods through an inventory and a valorization of projects and experiments concerning the introduction of information technology in education and training;

4. heightening of the awareness of decision-makers and potential users where the introduction of informatics is concerned, through the preparation of basic documentation on the subject;

5. clarification of the introduction of informatics in education and training through the INFODUC survey.

In September 1989 the Informatics and Education Committee met to take stock of each of these aspects and to propose broad lines of action for the 1990-1991 biennum. In the light of the results achieved, and to enhance the project qualitatively, the Committee recognized that the time had come to organize a major symposium in Africa to step up the mobilization and concerted efforts of African countries for the introduction of information technology in education, to seek more partners, and to further decentralize activities.

In pursuance of this project, the Ecole internationale de Bordeaux joined forces with UNESCO to organize the Informafrica Seminar.

Thus, first and foremost, the present seminar comes within the terms of reference of the ACCT, whose mandate was reaffirmed at the Dakar Summit, because as a unique francophonic inter-governmental organization it constitutes an institutional guarantee of the multilateral dimension which must be the presiding consideration in the conception and implementation of projects stemming from Summit decisions. Heads of State and Heads of Government lay emphasis on the ACCT's role of leadership, consultation and concertation.

This collaboration is evidenced in the series of meetings which the Secretary General of the Agency has held in recent months with the heads of international organizations with a view to identifying practical, useful and visible ways and means of establishing collaboration and co-operation. The Informatics and Education project is the first, and will not be the last, to benefit from the joint interest of our two organizations.

Information technology is an undeniable reality; it permeates our life and penetrates all fields of activity in our societies. A few years ago, it seemed to border on science fiction, and now it has become commonplace where certain services are concerned. We are no longer surprised or put out to encounter it in banks or airline reservation offices, to cite only two examples of services which employ an impressive panoply of new technologies: informatics, telecommunications, data-bases, electronic fund transfers, and so on. True, there are very considerable differences in the use of informatics between North and South at the present time, particularly in quantitative terms. Several Heads of State of our

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countries have already adopted policies concerning the introduction of informatics necessitating, apart from the acquisition of hardware and software, the training of users and specialists in all their countries' fields of economic activities.

To acquire familiarity with its many applications, information technology must first be considered as a subject to be taught. The second requirement is the training of specialists who will be called upon to prepare policies of introducing informatics, to define the framework in which informatics will be set up and managed, and to master and develop fundamental concepts, techniques and methods for the development of applications in what are judged to be priority fields.

Education is seen as a field to be given precedence, because it will help to speed up the mastery of informatics, make it possible to train specialists to produce software matched to the social, cultural and political contexts of our countries, and contribute to the development of a new sector of economic activity through the adoption of coherent policies.

There has been, and there still is much research and experimental work on the applications of informatics in education. Several models and approaches have been established: computer aided courses, computer aided instruction, the development of the concept of a computerized teaching/learning environment, computer aided instruction incorporating advances in artificial intelligence in the production of educational software, pedagogic robotics, and so on. All of which testifies to the number, variety and creativity of those engaged in research on the use of information technology as an aid to education and training.

My purpose in making this enumeration is to bring out the need to share past experience and projects and to seek, in planning new projects, partners from among both North and South countries so as to learn lessons from the results achieved (whether positive or negative), pool existing expertise, and thereby make effective progress without having to repeat the same projects in each country.

The creation of a data bank containing information on projects, experiments, research and development to be made available to everyone concerned with informatics and education could be a way of promoting technological transfers and could give rise to collaborative initiatives.

Your task during this seminar will not be an easy one. The subject is vast, and is in the process of change and development. On the basis of the pooling of information on the situation of informatics in education in the countries represented at this seminar, you will have to rapidly identify opportunities which could lead to the implementing of projects to ensure the optimum use of technologies for the development and improvement of the educational systems of your respective countries.

I express the hope that all of us, collectively and individually, whatever our country or our organization, will at the close of this seminar have, in addition to a substantial programme of action, a professional and cultural "plus" to share with our colleagues.

I wish to thank the Togolese authorities, the Director-General of UNESCO, and all those who have made this seminar possible.

Jean Louis Roy,
Secretary General of ACCT

ANNEX III

THE DIRECTOR-GENERAL OF UNESCO'S ADDRESS TO THE SEMINAR, READ BY HIS REPRESENTATIVE AT THE OPENING SESSION

I wish to express my sincere thanks to the Government of the Republic of Togo for its generous provision of facilities for this seminar, which has been organized jointly by UNESCO and the Cultural and Technical Co-operation Agency (ACCT). I would also like to express my gratitude to Professor Komlavi Seddoh, Rector of the University of Benin, for his valuable contribution.

This seminar lies within the framework of the Priority: Africa programme, which has been put into effect by UNESCO - in the general framework of the United Nations Programme of Action for African Recovery and Development, to address the urgent problems of development facing Africa within the Organization's fields of competence.

Operating at the interface of two of these fields of competence, its purpose is to explore the challenges and opportunities associated with the incorporation of informatics in general education in Africa and, to that end, to consider possible strategies for the promotion of both multilateral and bilateral co-operation, for the strengthening of institutions in the region and for the development of a general plan of action in this domain.

We are currently experiencing a technological revolution no less profound than the industrial revolution that transformed the economic and social face of the world in the nineteenth

century. Microelectronics-based technologies have become the indispensable key to understanding, transforming and managing the world in which we live. In almost every sphere of human activity, the application of informatics is opening up radically new avenues of intellectual and practical progress. The marriage of informatics with telecommunications, enhancing opportunities for the integration and sharing of knowledge, is helping to ensure that this revolution gathers momentum as it proceeds.

The informatics revolution represents an inescapable challenge for the countries of Africa. In 1980 African leaders demonstrated their resolve to cope with the economic crisis affecting the continent when they adopted the Lagos Plan of Action. Subsequent trends have underscored the need for development strategies to take full account of accelerating technological changes. For instance, it is in some cases no longer a viable economic proposition for African countries to pursue industrialization programmes geared to substituting local products for imports. Nor is it always possible for the developing countries to rely on the value of their raw materials, as synthetic products deriving from new materials technology or biotechnology and ranging from minerals to agricultural produce have come to replace or compete with many of the traditional exports from these countries. In an age in which know-how and innovative capacity, more than natural resources and labour, have become the major determinants of economic competitiveness and prosperity, education - for Africa as for all other countries - is more than ever the sine qua non of development.

Just as education is essential to the mastery of informatics, so in turn informatics can be a powerful aid in promoting the effectiveness of education. Both the World Conference on Education for All (Jomtien, Thailand, March 1990) and the 42nd Session of the International Conference on Education (Geneva, September 1990) underlined the importance of the judicious use of modern technologies in education for both

instructional and management purposes. In the same vein, on the occasion of the Second United Nations Conference on the Least Developed Countries (UNESCO, September 1990) I suggested that top priority be given to local capabilities where informatics is concerned. Informatics constitutes an excellent means of making the fullest use of skills in various spheres of activity and of organizing labour. It can make a great impact on the least developed countries on condition that its introduction into the various sectors be implemented according to an appropriated and selective strategy. This strategy must place emphasis on the training of human resources in the education system. It must also be sustained by the establishment of regional and sub-regional networks capable of reducing costs, aiming at developing software rather than hardware, and guaranteeing the maintenance of hardware.

To help outline these strategies is precisely the reason why UNESCO has convened this meeting which is intended among other things, to identify how countries can best formulate national policies and strategies without losing sight of the three relational aspects of education and informatics:

- informatics <u>as subject to be taught</u>;

- information technology as a <u>teaching and learning tool</u>; and finally

- Computers as a tool for the <u>management</u> of education systems.

Since the Inter-governmental Conference on Strategies and Policies for Informatics (SPIN), organized under its auspices in Torremolinos (Spain) in 1978, UNESCO has done much to develop its assistance to developing countries in this field - as evidenced by numerous programmes and projects in African countries. Now, in the context of "Priority: Africa", the time has come to focus special attention on the Africa region and, with the help of experts such as yourselves and the

indispensable support of the governments concerned, to launch a more comprehensive programme for the development of informatics in Africa.

The magnitude of the challenge should not cause us to overlook the significance of what is at stake. This was highlighted by His Excellency Félix Houphouet-Boigny, President of the Republic of Côte d'Ivoire, when he said:"Thanks to informatics, technological shortcuts to development exist today and are within the reach of everyone. We are not therefore doomed to remain underdeveloped forever. However, we must be sure not to miss this new opportunity, and our first actions must be geared to ensuring that decision-makers adopt an appropriate attitude towards it".

UNESCO stands ready, in co-operation with valued partners such as ACCT, to foster this process through the promotion of international, regional and sub-regional co-operation. Informafrica testifies to this intention and, with your help, will be an important first step on the way to the achievement of our goal.

Once again I thank the national authorities, the Director of ACCT and all those who have helped to make this seminar possible, and I wish you every success in your deliberations.

Federico Mayor,
Director-General of UNESCO

ANNEX IV

ADDRESS BY THE TOGOLESE MINISTER OF TECHNICAL EDUCATION AND VOCATIONAL TRAINING, AT THE OPENING SESSION

Members of the RPT Central Committee,

Your Excellencies,

Representatives of International Institutions,

Ladies and Gentlemen,

It is with a great pleasure that I cordially welcome you to Togo. For five days, you are going to pool your experiences on the introduction of informatics in education, review problems encountered by each and every one of you, and examine lines of approach to solutions. This task will certainly not be easy in view of the disparity of your experiences, potentialities and resources. In any case, this meeting should provide you with another opportunity of thoroughly examining the problem which most of you have dealt with on several occasions either at the sub-regional and regional levels or at the international level, namely the most appropriate way in which informatics can be used in the service of the development of education in Africa.

The fact that the problem of the introduction of informatics in education is the concern of so many countries,

international organizations and individuals is evidence that the issue deserves the attention given it by the eminent community you are representing here.

If many European, American and Asian countries have opted for a scientific approach to the use of informatics and made the computer an everyday tool in business, at home, and at school, it is because in contemporary society interrelationships are becoming increasingly complex and the volume of data to be processed is constantly mounting. So in order to process these data which have become a necessary component of social development and therefore a key element in decision-making at various levels, a fast, efficient and rational tool is needed.

It is obvious that in our countries, where development requirements are numerous and varied, any technology capable of helping to maximise output without having a detrimental effect on national, human and other resources cannot be favourably welcomed. Informatics, properly used and adapted to our pedagogic aid which will help to overcome the problems of overcrowded schools and the shortage of textbooks and teaching aids.

The modernization of curricula to make them more adaptable to the rapid development of science and technology is an issue which has always been a concern of UNESCO and ACCT. We therefore commend the decision which both institutions have taken to meet in Lomé in order to enable you to give thought to the problems of informatics in schools. The numerous meetings to which they have given rise in Europe, America, Africa and Asia have made it possible to progress beyond the stage of "why" and "for whom" in approaching their problems. It seems to me that the relevant questions to be asked today are: How are we to introduce the computer into the school so that it better meets our educational needs and purposes? What courseware, for which curricula? What types of teachers for what types of curricula?

Where Togo is concerned, this country has decided to tackle this issue by following the various resolutions of the UNESCO General Conference and the different sub-regional and regional seminars on the subject. The computer is used in Togo as a managerial tool in education (administration of pupils and students, personnel management, administration of scholarships for secondary schools and universities, of various examinations etc.) in the different departments of the university for which the computer centre constitutes a computerized educational environment. Furthermore, in order to institutionalize informatics in schools, a national commission was set up to examine problems relating to the introduction of computers in secondary schools. The findings of this commission is expected by the end of this month.

At the same time, a science secondary school was inaugurated when schools reopened in September 1990. This school serves as an experimental pilot centre. A training programme for instructors was introduced so that pupils can be ready to use their micro-computers by January.

In technical education, the problem is markedly different. Informatics is widely taught because it is unthinkable today that a secretary, an accountant, a technician or an engineer could qualify without knowing how to use a computer.

Nevertheless, despite our very modest achievement, which compares quite favourably with that of other African countries, much progress remains to be made. This calls for a concerted effort and explains why we consider that the Lomé Conerence is of capital importance and should provide each one of you with an opportunity for the exchange of fruitful and positive ideas on the best way to reconcile informatics and education. In this area, the human factor is in my view of prime importance, considering the shortage of skilled manpower where informatics in education is concerned. It would therefore be appropriate to give thought to a training policy for instructors, a determining factor in the smoothe

implementation of the project. Only a well-conceived training policy can help to meet our needs in the face of the very rapid expansion of the introduction of informatics in education, and this expansion is not always matched by the creation and production of suitable teaching materials. In my view it is crucial in this respect to think of the least expensive way of producing software and courseware adapted to our needs, programmes and socio-economic circumstances. The pooling of resources at the regional and sub-regional levels in accordance with the proposals already made is, to my mind, likely to be the best way of providing quality materials at low costs.

In any case, I consider it important that your deliberations may help you to circumscribe the problems of informatics in education so that we can move from the promotion of the introduction and training in informatics to a comprehensive policy whose main objectives would be to ensure an efficient use of the computer in the teaching and learning of all subjects.

Wishing you every success in your deliberations, I declare open the Inter-African Seminar on Informatics in the Service of Development of Education in Africa.

Koffi O. Eddoh,
Togolese Minister of Technical
Education and Vocational Training

ANNEX V

ADDRESS BY THE REPRESENTATIVE OF THE SECRETARY-GENERAL OF ACCT AT THE CLOSING SESSION

Representatives of the Minister of Education and of the Director-General of UNESCO,

Your Excellencies,

Mr Chairman,

Ladies and Gentlemen.

We have come to the end of this major Symposium on Informatics in the Service of Education in Africa. The objectives which we set have been attained, namely to initiate or continue the dialogue to explore the problems involved in the introduction of new information technology in education in Africa, examine the strategies to be adopted to identify ways of establishing multilateral co-operation, and propose a general plan of action.

To begin with, I would like to express my thanks to the Government of Togo for the welcome it has extended us, the working environment it has provided, and the fraternal sentiments it has manifested throughout this symposium. It has generously provided first-rate facilities for the holding of this event.

I am grateful also to the organizers of this symposium, who have handled the registration formalities, the logistics, and the reproduction of the participants' communications, and have placed at our permanent disposal a competent, conscientious and courteous staff to meet our requests and make our stay in Lomé as pleasant as we could wish.

I also wish to thank all the participants (national representatives, experts, speakers) for having thrown light on the situation of information technology in their respective countries and sought, open-mindedly and with due regard for cultures, broad lines of collaboration and action for the introduction of informatics in education in their countries.

The quality, relevance and number of recommendations tabled at this seminar themselves testify to the work accomplished.

I wish to make special mention of the fact that this seminar is the result of a partnership between ACCT and UNESCO - the first of its kind. This co-operation was the outcome of meetings between the Director General of UNESCO and the Secretary General of ACCT with a view to identifying practical, useful and visible ways and means of collaboration and co-operation.

Informatics in the service of education, seen as a means of helping to improve and modernize education systems, may indeed be regarded as the best choice of subjects to strengthen the co-operation between our two organizations, since it concerns the training of human beings, the primary resource for insuring national economic development.

The first collaboration between our two organizations in the context of this seminar was initiated, scarcely two months ago, following a request from the Ecole Internationale de Bordeaux. It was made possible thanks to a responsive attitude and a determination to break down barriers to bring about ths co-operation.

During this seminar, it was particularly interesting to note the convergence of the utterances and ideas of the guests of UNESCO and ACCT on the problems involved and on ways and means of incorporating information technology in education, some concrete attempts at which have already been made.

The concerted efforts and pooling of ideas advocated among French-speaking countries in May 1987 can be extended beyond the common language which forms a bond between us, is so far as the Informatics and Education programme creates an opening for different linguistic groups, and in particular for informatics in the national language.

The South-South synergy is assuming increasing importance in the context of the world-wide spread of computerization, the world-wide expansion of markets, and the growing role of strategies of scientific co-operation between universities, research centres and private businesses in national socio-economic development.

Scientific and technical research and development is still the preserve of an élite, but in the context of this world-wide extension of information technology and the world-wide expansion of markets, everyone in all countries is required to possess some knowledge of science and technology, and more specifically of the latest information technology. Endogenous research and development, enriched by international collaboration, must be encouraged.

I place great hope in, and expect much from, the recommendation concerning the creation of a working group to prepare and keep up-to-date a method of incorporating information technology in education, and the formulation of standard responses in accordance with common trends in the countries concerned.

This seminar has fortified ACCT and the Informatics and Education Committee. The idea of publishing a liaison bulletin backs up the decision to continue the BRIE (Bulletin du Réseau Informatique et Education). We are prepared to give space in the bulletin to articles from all African countries.

The training of instructors will be carried forward through further training seminars, which should be held in member

countries, at the same time seeking to strengthen existing institutions.

The enhancement of projects through the creation of data banks on projects already approved or in progress, so as to disseminate information and results to all institutions, will continue, and whenever possible other relevant aspects will be added to these data banks.

It has clearly emerged from the seminar that plans to introduce information technology must make due allowance for the stage of advancement of computerization in the country concerned, as well as at the sub-regional and regional levels.

The directories identified in the general report already announced at the level of French-speaking countries should be continued by ACCT.

Personally, I ratify the report as approved this morning; it will substantially back up the continued planning of the action of ACCT where informatics in education is concerned.

I shall continue to support and to seek collaboration with UNESCO in practical, useful and visible joint actions so that the Member Sates of both our organizations may derive the fullest benefit.

Once again, I thank the authorities of the Government of Togo for having provided a working environment conducive to reflexion and for having organized cultural activties of a high standard.

In conclusion, I wish you all a pleasant return journey to your countries and your families. Thank you.

Paul Lessard,
Responsable for the Programme of
Informatics and Telecommunication,
Ecole Internationale de Bordeaux

ANNEX VI

ADDRESS BY THE REPRESENTATIVE OF THE DIRECTOR-GENERAL OF UNESCO AT THE CLOSING SESSION

Representative of the Minister of Education and Scientific Research,

Your Excellencies,

Ladies and Gentlemen.

First I wish to express, on behalf of the Director-General of UNESCO, Mr Federico Mayor, very sincere thanks to your Government, to you yourselves, to the Rector of the University of Benin, and to all his colleagues, thanks to whose support and collaboration throughout this seminar we have, I think I may say, attained objectives which some might consider ambitious.

This has been possible, naturally, thanks also to the lively interest taken in our work by all the participants; I thank them for having accepted the invitation of UNESCO and the Cultural and Technical Co-operation Agency. My thanks are also due to all the institutions whose representatives attending this seminar have made a valuable contribution to our work.

Since most African Member States are represented at this seminar, I think it can be said that our work, and the

conclusion reached, accurately reflect the situation of the continent as a whole.

In opening this seminar, the Togolese Minister of Technical Education and Vocational Training stated that (I quote): "In our countries, where development requirements are numerous and varied, any technology capable of helping to maximise output without having a detrimental effect on nation, human and other resources cannot but be favourably welcomed".

The objectives of the seminar have, in my view, been attained.

- Firstly, a thorough diagnosis of the present situation of infomatics in education in Africa had been undertaken, and much information has been assembled, exchanged and analysed. I was struck by the wide diversity of efforts already made in many countries; efforts all the more laudable in that a number of such countries made a reference to a vicious circle difficult to break out of: that of underdevelopment, the financial crisis, and structural adjustments, entailing a diminution of resources that could be allotted to education, and hence difficulty in financing the innovation - seen as costly - represented by the introduction of information technology in education.

- It is to break out of this vicious circle that you have attempted to establish, in outline, policies and strategies to be adopted; this was the second objective of our meeting. For, as your conclusions show, this is the first stage of the incorporation of informatics in education systems. A further stage is to heighten the awareness of all concerned: decision-makers, teachers, parents, and the population in general.

- Thirdly, you have specified the various essential components of these strategies, namely the build-up of national planning and programming capacities. This point is of prime importance, and a number of participants stressed several aspects of the necessary relationship between informatics and a reform of the education system: full use of resources, higher internal and external efficiency through more relevant teaching and learning procedures, more efficient management, and closer matching to the requirements of economic and social development. Information technology cannot be merely an instrument purely and simply superposed on the education and training system. You advocate the provision of instructors, training in national skills to insure the adequation and maintenance of hardware, and the development of African expertise in the design and production of software, based on research and development.

- Fourthly, in the light of these strategy components you have identified the principal priorities to be assigned to co-operation at the international, regional and sub-regional levels, the forms which you think such co-operation should take, and how it can be strengthened. These forms of co-operation can help you to explore and exploit ways and means of mastering the various components of information technology systems (hardware and software) matched to the national environment as a whole, without on that account failing to take advantage of the lessons of experiences in other countries and technologies developed in other continents, in so far as they are seen to be appropriate and transferable after evaluation by African researchers.

Some of the aspects of information technology in schools that have been referred to here so as to provide food for thought

among teachers may have seemed to reflect differences in stages of advancement from one country to another, but I believe, on the contrary, that they triggered a certain determination, as was our intention. Several participants appealed for creative imagination, on which the philosopher Bachelard (aptly cited by one of you) set much store. Various examples were given of activities designed to bring informatics within the reach of local communities so as to familiarize people with computers, at least in an initial stage. It is along these lines, in particular, that research workers should work in conjunction with other specialists and field workers acquainted with methods of encouraging innovations and making use of opinion leaders.

This is the approach which will bring us closer to breaking out of the vicious circle already referred to by some of you who see education for all difficult to reconcile with new technologies of communication and information. And it is the line that can and should be followed where higher education is concerned. It provides African universities and research institutions with an objective for work promoting interdisciplinary community development. Informatics in education can begin, perhaps, with informatics in a public place open to all, just as was the case with radio in countries engaged in community development.

Where co-operation is concerned, some delegates referred to the fear that linguistic barriers would be a hindrance to exchange of information, individuals and software. It was precisely to smooth out these difficulties that this seminar brought together representatives of all the sub-regions of Africa. I am convinced that you will succeed in removing these obstacles, which are far from being immovable. Certain forms of sub-regioanl co-operation defined in terms of linguistic areas are admittedly inevitable, and even useful, from the

point of view of immediate efficacity. But it is essential that a more wide-ranging solidarity be established, notably in the context of the mechanism of technical co-operation among developing countries and the African solidarity expressed in the Lagos Plan. This solidarity must be assiduously sought and given concrete form also in forms of co-operation which, extending beyond the boundaries and cleavages between foreign models, allow of the homogeneity of various activities such as inventories, directories, joint data banks, bulletins, and other joint means of exchanging information. All these resources and instuments can be bilingual or trilingual. This concertation must naturally extend to international co-operation measures, whether multilateral or bilateral, whose practical manifestations include notably round-table meetings of donors and the country programming of UNDP.

It seems to me that the concept of infomativity advanced in a recent publication could usefully express a concern shared by many of us and which, in the field of information, is comparable to the concept of productivity. The informativity of an education system (education here being considered in both its formal and non-formal aspects) may be analysed like that of a business undertaking. It represents the capacity of the system to attain its qualitative and quantitative objectives through the optimum use of all available identified or identifiable information; this it does by gathering and processing such information in ways most relevant to the needs which the system must meet.

I will go as far as to extend this concept of informativity to all African education and training systems. For this region must indeed optimize the processing and utilization of all existing information for the benefit of education for all, and it must do so through a considerably strengthened co-operation.

Director, Ladies and Gentlemen,

On the basis of the opinions, conclusions and proposals formulated at this seminar, the fullest recognition will be given to your needs and desiderata in our concertation with the sources of funding of the United Nations System, and other sources, both multi-lateral and bi-lateral. All our partners will be promptly informed of the results of our meeting, the Final Report of which will be very widely circulated among all the institutions, governmental and non-governmantal, concerned with the subject of our deliberations. Their attention will thus be drawn to the three essential needs you have expressed: co-ordinated exchanges of information and joint research; the training of personnel exerting a multiplier effect; and solutions to the problems posed by hardware and software. It is indeed the duty of the Priority: Africa programme to make your needs better known and to help you to apply appropriate solutions in a concerted manner.

Where UNESCO is concerned, I can assure you that the Director-General will take the proceedings of this seminar fully into account, firstly in the execution of the current Programme (whose budget , naturally, has already been established and does not allow of much modification) and most importantly in the preparation, now in progress, of the Draft Programme and Budget for 1992-1993. I am also convinced that the organs of the IIP will not fail to promote Informafrica by following up the desiderata you have expressed.

Thank you all, once again, for your contribution to this seminar, which I think it can be said has been worth-while and fruitful for our continent.

John B. Kaboré,
Director, Co-operation with African Member States (UNESCO, CAB/CA) and Coordinator for the Seminar

ANNEX VII

ADDRESS BY THE REPRESENTATIVE OF THE TOGOLESE MINISTER OF EDUCATION AT THE CLOSING SESSION

The Ministers of Education and Scientific Research and the Minister of Technical Education and Vocational Training have requested me to represent them at the closing session of your seminar.

On their behalf, I would like to congratulate you on the important work you have accomplished and on the conscientious manner in which you have conducted your proceedings.

For a week, you have shared your experiences of the introduction of informatics in education, reviewed the different approaches to this issue, analysed the problems you have encountered and the solutions that have been proposed to solve them. Whether you are in the exploratory stage or the experimental stage, or whether you already have a plan for the computerization of your schools, it has emerged from your analyses that the problems encountered are all of the same order, namely those of the introduction of a new technology in a socio-cultural environment insufficiently prepared to absorb it. Among the problems raised are teaching skills, the cost and quality of hardware, the teaching methods to be employed, and the rigidity of curricula.

Furthermore, you have benefited from the contributions of eminent experts to whose competence and services I take this opportunity of paying tribute; they have enabled you to bring the problems of the introduction of informatics in education into focus and have helped you to realize the potential uses of computers in the light of some case studies.

Your discussions have certainly not enabled you to get to the bottom of all the questions arising, such as who to train in informatics, on what scale, and under what incentives. But your deliberations have enabled you to sort out the problems involved, to identify the constraints, and to propose lines of action.

Generally speaking, you have realized - and rightly so - that no policy for the introduction of new technology in the education sector has any chance of success unless account is taken of certain fundamental problems, among them the training of maintenance personnel, the production or acquisition of materials matched to the socio-economic circumstances of our countries, the definition of clear objectives, and the reform of curricula. Your recommendations addressed to our countries amply reflect these concerns, but they also underline the need to go beyond the confines of small States and establish a truly international policy where the introduction of informatics is concerned. In this respect, the sub-regional, regional and North-South co-operation which you advocate seems to me to offer the possibility of pooling resources so as to reduce acquisition costs considerably. I welcome this consensus, and I am pleased to note that the representatives of international organizations and funding agencies who have attended this seminar share your views on this subject.

On behalf of the Togolese Government, I wish to thank UNESCO and ACCT for all they have done to enable this seminar to be held. Our Government is also grateful to ADB, ECOWAS, the World Bank, and all the regional, sub-regional and international organizations which have consented to join in your deliberations, and whose presence has been highly appreciated.

Togo itself will follow up all your recommendations and will do everything possible to ensure that informatics may render maximum service to education in the framework you have defined.

I wish you a pleasant jouney back to your respective countries, and declare the Seminar on Informatics in the Service of the Development of Education in Africa closed.

ANNEX VIII

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ANNEX IX

LIST OF DOCUMENTS

Doc.CA/Lomé/1	Terms of reference
Doc.CA/Lomé/2	Agenda
Doc.CA/Lomé/3	Working Methods
Doc.CA/Lomé/4	Discussion Guide
Doc.CA/Lomé/5	Information Technology in Education - The case of Togo (Case study No. 1)
	Informatics in Education (Case study No. 2)
	Strategies for Informatics in Education for Africa (Case study No. 3)
	Informatics in Education (Case study No. 4)
	Introduction of Informatics into Education Systems - Algeria's Experience (Case study No. 5)
	Informatics in Education in Senegal (Case study No. 6)
	Informatics in Highr Education - Kenya (Case study No. 7)
	Fundamental Problems in Teaching Informatics - Nigerian Experience (Case study No. 8)

Informatics and Education - Experience of the African Institute of Informatics (IAI) (Case study No. 9)

Informatics in Education in Africa (Case study No. 10)

A Review of Informatics and Education in the Arab world (Case study No. 11)

National Policy on Informatics in Education - The case of Nigeria (Case study No. 12)

Study on Informatics and Education in Côte d'Ivoire (Case study No. 13)

Doc.CA/Lomé/6

Address by the Rector of the University of Benin (Declaration No. 1)

Address by the Representative of the Director-General of the United Nations Educational, Scientific and Cultural Organization (UNESCO) (Declaration No. 2)

Address by the Representative of the Cultural and Technical Co-operation Agency (ACCT) (Declaration No. 3)

Address by the Representative of the host country (Declaration No. 4)

Informatics and Teacher Education, by Mr Peter Bollerslev (Denmark), UNESCO Consultant (Declaration No. 5)

Informatics as a Learning Tool, by Mr David Walker (Scotland) (Declaration No. 6)

"La problématique de l'introduction de l'informatique dans les systèmes éducatifs des pays africains", by Jean Vergnes (France) (Declaration No. 7)

"L'implantation des nouvelles technologies de l'informatique (NTI) en éducation: politiques et stratégies", by Pierre Bordeleau (Canada), ACCT Consultant (Declaration No. 8)

Statement by Mr Dénis Ballini of "Centre National de Documentation Pédagogique" (CNDP) (France) (Declaration No. 9)

Documents prepared by ACCT

Le contexte de l'évolution du projet Informatique et Education

Cahier d'implantation des nouvelles technologies de l'information en éducation

L'implantation des nouvelles technologies de l'information (NTI) en éducation: politiques et stratégies

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